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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10,052,307	01/17/2002	George R. Koch	KLA1P050-P768	8405

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EXAMINER

LEYBOURNE, JAMES J

ART UNIT PAPER NUMBER

2881

DATE MAILED: 04/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,307

Examiner

James J. Leybourne

Applicant(s)

KOCH ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other

DETAILED ACTION

Claim Objections

1. Claim 2 is objected to because of the following informalities:

In claim 2, line 3, "test subject" should be "test object".

Claim 7 does not cite its dependency on claim 6.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that they fail to point out what is included or excluded by the claim language.

Claim 3 recites the limitation "the top surface" in line 6. There is insufficient antecedent basis for this limitation in the claim.

Claims 4 and 5 are indefinite by virtue of their dependence on claim 3.

Claim Rejections - 35 USC § 103

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4 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action.

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamattina (USPN 458479). In Fig. 3, Lamattina discloses an electron beam lithography system comprising a particle beam imaging column (lithography system) with staged vacuum seals coupled to the imaging column between the column and a working surface **45** for maintaining at least a first predefined area of the working surface in a vacuum environment. Lamattina's invention relates to apparatus for carrying out a process in a vacuum and, more particularly, relates to an envelope apparatus for carrying out a process in a vacuum at a localized region on the surface of an article (column 1 lines 13-16). The lithography system shown in Fig. 3 is an example of a process carried out in a vacuum and the apparatus could also be applied to an SEM.

In column 10, lines 44-46, Lamattina teaches that the vacuum envelope, as shown in Fig. 6, 7 and 10, may also ride on a planar air bearing in order to maintain the gap within an acceptable range.

It would be obvious to one of ordinary skill in the art at the time of the invention that a scanning electron microscope could be used to replace the lithography system shown in Fig. 3 and the vacuum envelope could ride on a planar air bearing in order to maintain the gap within an acceptable range as taught by Lamattina. The resulting apparatus would provide localized

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vacuum processing, thus producing efficient utilization of vacuum and reducing the size and complexity of vacuum processing apparatus for the scanning electron microscope

Regarding claim 2, an alternate method of maintaining the proper gap between the vacuum envelope would comprise making the height of the vacuum envelope stationary and provide a means for planarizing the working surface, i.e. the surface being imaged by the to maintain it at a constant distance from the tip of the vacuum envelope. Lamattina teaches several methods for achieving this (column 5, lines 17-48). It would be obvious that by providing a test object planarizing means, as taught by Lamattina, the scanning electron microscope would have a capability to scan test object that had non-uniform surfaces, e.g. warped wafers.

6. Claims 6-10 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamattina as applied to claim 1 in view of Law (USPN 3600065). As shown in Fig. 3, Lamattina discloses a particle beam device which operates upon a test subject, wherein at least a portion of the particle beam device is maintained in a vacuum. The particle beam device comprises a particle generator (electron source), a particle focusing device (lens elements) in a particle beam column 35. Referring to Fig. 2, Lamattina teaches when envelope apparatus 27 is moved with respect to article 30, typically by movement of article 30, but in some cases by movement of processing apparatus 27, portions of the surface area to be treated are successively exposed to the internal processing zone 32 having an orifice of dimension "d" within vacuum envelope apparatus 29. However, he does not teach a plurality of air bearings to support the particle beam column and to permit the particle beam column to move in a nearly frictionless manner across a top surface of a first support table.

7. Regarding claims 6 and 16, Law discloses an optical projection head adapted to maintain a lens system at a constant distance from a focal surface, including a support member in the form of a hollow elongated sleeve, a lens mounting member coaxially located within the support member and supporting a lens system defining an optical axis which is perpendicular to the focal surface, bearing formations spaced along the optical axis for slidably supporting the lens mounting member for movement in a direction parallel to the axis, and the lens mounting member having an end portion projecting from the sleeve which defines a gas bearing for supporting the lens system at a predetermined distance from the focal surface (abstract). In the sole Fig. 1, an optical projection head **10** is positioned over a photosensitive surface **13**. The sleeve **11** is positioned with its longitudinal axis substantially at right angles to the film surface **13** and an air bearing **20** is provided between an end **21** of the member **12** and the film surface **13**. Air bearing **20** allows the projection head **10** to be moved over the photosensitive surface **13** without contact, thus avoiding damage to the photosensitive surface.

It would have been obvious to one of ordinary skill in the art that the particle beam device which operates upon a test subject could be modified to support the envelope apparatus **29** on air bearings to permit the particle beam column to move in a nearly frictionless manner across a top surface of a support table in analogy to the method Law uses to support the optical head. This would provide relative motion between the particle beam column and the test object without requiring the bulky and expensive vacuum stage and would provide improved wafer handling abilities that would be a significant improvement in the semiconductor test and measurement industry.

Regarding claims 7-10 and 17-19, the particle beam column of Lamattina comprises a staged vacuum seal comprising a plurality of concentric, reduced pressure zones around the first particle beam column (Fig. 5-7). The tip of the vacuum envelope is shown in bottom view in Fig. 5 and 6 and in cross section in Fig. 7. The tip in Fig. 5 corresponds to the three-stage vacuum envelope shown in side view schematic view in Fig. 3 and 4; the tip in Fig. 6 and 7 corresponds to the three-stage envelope plus air bearing embodiment shown in Fig. 10. For the three-stage vacuum envelope, high vacuum zone **65** is surrounded by conical member **68** and is connected to high vacuum pump **36**; intermediate vacuum zone **66** is surrounded by annular conical member **69**; and is connected to second stage vacuum pump **54**; and intermediate vacuum zone **67** is surrounded by external conical member **70** and is connected to first stage vacuum pump **53** (column 9, lines 12-35).

8. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lamattina in view of Law as applied to claims 6-10 and in further view of Young (USPN 4818838).

Regarding claims 11 and 12, Lamattina teaches a wafer handling system (Fig. 8 and 9) comprising a moving conveyor **83** with a surface **82** having wells **84**. The wells **84** are configured to receive semiconductor wafers **80** having flats **81**. Preferably, the exposed surfaces of the semiconductor wafers are coplanar with the surface **82** of conveyor **83**. Also, preferably, wafers are held in wells **84** by conventional vacuum chuck means (not shown). By analogy with the optical projection head taught by Law, it would be obvious to have the first surface of the wafer coplanar with the top surface of the first support table.

Regarding claim 13, Young teaches that lifter assemblies in a first extended position receiving the semiconductor wafer and in a second retracted position holding the semiconductor

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wafer in proximity to a vacuum chuck so that the vacuum chuck can hold the semiconductor wafer are used in conventional stages for wafer handling systems (column 5, lines 7-13). As discussed under claim 1, by analogy with the optical projection head taught by Law, it would be obvious to have the first surface of the wafer coplanar with the top surface of the first support table.

Allowable Subject Matter

9. Claims 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is an examiner's statement of reasons for allowance:

Regarding claim 14, the prior art teaches the use of air bearings to adjust a gap between a surface of a wafer and the tip of a vacuum seal apparatus by applying the air bearing to either adjust the height of the wafer relative to a fixed height of the vacuum seal apparatus or to adjust the height of a vacuum seal apparatus relative to a fixed height of a wafer surface. However, the prior art does not teach or fairly suggest using air bearings to adjust the gap between a test object and a vacuum seal apparatus by using air bearings to adjust the height of a test object in a frame wherein a first surface of a test object is in an essentially co-planar relationship with the top surface and also using an air bearing to adjust the height of a vacuum seal apparatus in an essentially co-planar relationship with the top surface.

Regarding claim 15, the prior art does not teach or fairly disclose locking and releasing lifter assemblies wherein the lifter assemblies are filled with a low melting point metal alloy.

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heat being applied to the lifter assemblies when the lifter assemblies are required to move from the first position to the second position and when the lifter assemblies are required to move from the second position to the first position. heat being removed and the metal alloy solidifying. fixing the lifter assemblies into position at all other times.

11. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James J. Leybourne whose telephone number is (703) 305-7067. The examiner can normally be reached on M-F 9:00 - 6:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on (703) 308-4119. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9317 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


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JJL

April 2, 2003


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